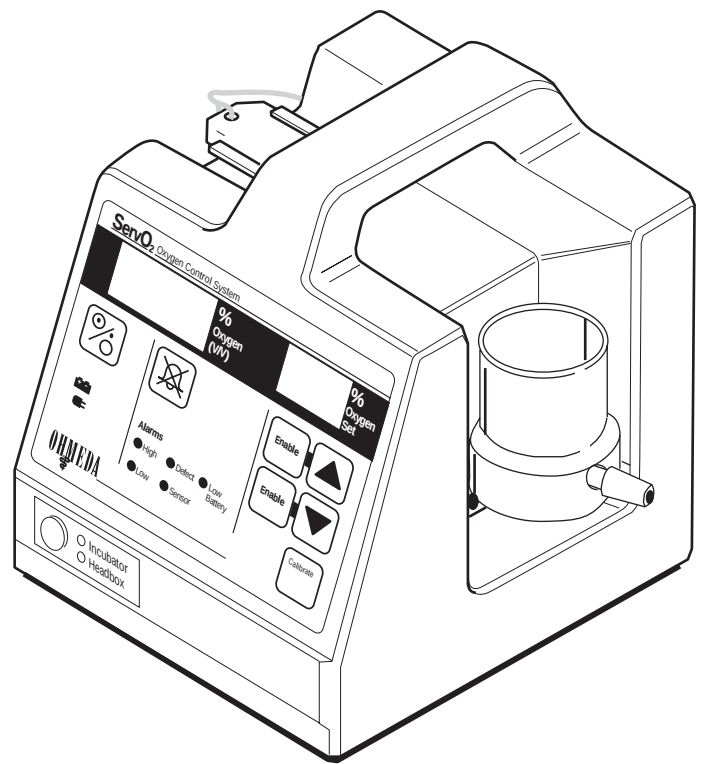


ServO₂TM Oxygen Control System

Operation, Maintenance &
Service Manual



User Responsibility

This Product will perform in conformity with the description thereof contained in this operating manual and accompanying labels and/or inserts, when assembled, operated, maintained and repaired in accordance with the instructions provided. This Product must be checked periodically. A defective Product should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, Ohmeda recommends that a telephone or written request for service advice be made to the nearest Ohmeda Regional Service Center. This Product or any of its parts should not be repaired other than in accordance with written instructions provided by Ohmeda and by Ohmeda trained personnel. The Product must not be altered without the prior written approval of Ohmeda's Quality Assurance Department. The user of this Product shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, improper repair, damage, or alteration by anyone other than Ohmeda.

CAUTION

⚠ U.S Federal and Canadian law restrict this device to sale by or on the order of a licensed medical practitioner.

Table of Contents

General Precautions

Warnings	iii
Cautions	v

1/General Information

Introducing the ServO ₂ Oxygen Control System	1-1
Oxygen Environment	1-1
Control Panel	1-2
Controls	1-2
Displays	1-3
Alarms	1-3
Low Cell Indicator	1-4
Operating Modes	1-4
Mounting Options	1-5

2/Operation

Preoperative Checkout Procedure	2-1
Set-Up	2-2
Calibration	2-3
Calibration Schedule	2-3
Calibration Procedure	2-3
Using the ServO ₂ Oxygen Control System	2-5
Incubator mounting bracket	2-6
Mounting the sensor	2-6
Assembly	2-7
Disassembly	2-8

3/Maintaining the ServO₂ Oxygen Control System

Cleaning	3-1
----------------	-----

4/Service procedures

4.1 Repair Policy	4-2
4.2 Maintenance schedule	4-2
4.3 Troubleshooting	4-3
4.4 Repair Procedures	4-4
4.5 Service Calibration	4-11
4.6 Service Checkout Procedure	4-14

Table of Contents

5/Illustrated parts

Exterior parts	5-1
Base, manifold and solenoid parts	5-2
Interior parts	5-3
Sensor mounting bracket	5-4
Service Kits	5-4
Complete units	5-4

6/Schematics

Pneumatic diagram	6-1
Control board schematic	6-2
Control and PSU board layout	6-4
PSU board schematic	6-5
Display board schematic	6-6
Display board layout	6-7

Appendix

Specifications	A-1
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Warranty

General Precautions

Definitions

What the attention symbol means

Next to each warning or caution, we have placed an “attention, read accompanying documents” symbol to alert you to the presence of these important statements. This is the attention symbol:



When the attention symbol appears in front of text that is printed on the system itself, it means that the text is elaborated upon in the operation manual.

WARNING: A Warning statement is used when the possibility of injury to the patient or the operator exists.

CAUTION: A Caution statement is used when the possibility of damage to the equipment exists.

~ Indicates alternating current.

☐ Indicates drip proof as stipulated in BS5724/IEC 601-1.

 Indicates IEC Type BF equipment.

 Indicates Class II equipment: earth connection not required for protection against shock. Protection is provided by the inclusion of double and/or increased insulation. When servicing use only identical replacement parts.

Important: An Important statement is similar to a note but is used for greater emphasis.

Note: A Note provided additional information to clarify a point in the text.

The following are general Warnings and Cautions. Precautions specific to certain procedures are found in the text of the manual.

Warnings

Before using the ServO₂ Oxygen Control System, read through this entire manual. As with all medical equipment, attempting to use this device without a thorough understanding of its operation may result in patient or user injury.

Always disconnect the power and gas supplies before performing service or maintenance procedures detailed in this manual. Apply power only if you are specifically instructed to do so as part of the procedure.

General Precautions

Oxygen concentrations higher than 40% can increase the risk of retrolental fibroplasia (retinopathy of prematurity). It is probable that even concentrations of 40% or less oxygen (formerly considered safe) could be dangerous to some infants. Therefore, arterial blood gas measurements are extremely important for regulation of the concentration of inspired oxygen when an oxygen-enriched environment is considered necessary. (See current edition of "Standards and Recommendations for Hospital Care of Newborn Infants" prepared by the Committee of Fetus and Newborn of the Academy of Pediatrics.)

Complete the "Preoperative Check-out " section of this manual before putting the unit into operation. If the ServO₂ Oxygen Control System fails any portion of the checkout procedure it must be removed from use and repaired.

To prevent the possible depletion of the oxygen supply, disconnect the ServO₂ Oxygen Control System from gas supplies when not in use.

Do not use the ServO₂ Oxygen Control System in the presence of flammable anesthetics; an explosion hazard exists under these conditions.

Do not use oil bearing materials on or near the pneumatic parts of this unit. Oils and grease oxidize readily, and in the presence of oxygen, they will burn violently. The air or oxygen parts must be discarded if they are contaminated with oil or grease.

Fire hazard! Even material that will not normally burn will ignite readily and burn rapidly in high concentrations of oxygen. Keep all sources of ignition away from the incubator or headbox. Display "NO SMOKING" signs prominently.

Spontaneous and violent ignition may occur if oil, grease or greasy substances come in contact with oxygen under pressure. Keep oil and grease away from regulators, cylinder valves, tubing and connections, and all other oxygen equipment.

Use only approved reducing or regulating valves marked for oxygen service on high pressure oxygen cylinders. Do not use valves for air or gases other than oxygen, since they may be hazardous when returned to oxygen service. Operate all oxygen equipment strictly in accordance with the manufacturer's directions.

High pressure oxygen and medical air equipment should always be located outside of the nursery. Securely fix cylinders in place so that they can not be knocked over while in use. Locate cylinders as far from the incubator or headbox as possible.

Use only equipment designed for use in hazardous locations in delivery rooms. Mixtures of oxygen and flammable vapors, such as alcohol, ether, ethylene and cyclopropane may explode if ignited. Electrical static spark discharges or high temperature surfaces, in addition to all other more common sources of ignition, may ignite these mixtures. Refer to Article 517 of the National Electrical Code, ANSI/NFPA 70, for the use of flammable anesthetics.

General Precautions



Cautions

Only competent individuals trained in the repair of this equipment should attempt to service it as detailed in the Manual.

Detailed information for more extensive repairs is included in the service manual solely for the convenience of users having proper knowledge, tools and test equipment, and for service representatives trained by Ohmeda.

Precautions specific to certain procedures are found in the text of the manual.

1/General Information

In this section

Introducing the ServO ₂ Oxygen Control System	1-1
Oxygen environment	1-1
Control Panel	1-2
Controls	1-2
Displays	1-3
Alarms	1-3
Operating Modes	1-4
Mounting options	1-5

Introducing the ServO₂ Oxygen Control System

The ServO₂ oxygen control system controls a patient's oxygen environment. By automatically changing the delivered gas ratio, it maintains the oxygen concentration level set by the clinician.

A comprehensive series of alarms include high and low oxygen concentration, sensor disconnected, short circuit or failure, battery running low and internal malfunction. The system has two modes of operation which allow it to be used with both incubators and head boxes.

Oxygen Environment

The ServO₂ oxygen control system has a finite flow capacity. If the rate of escape from the patient enclosure exceeds this flow, the unit will be unable to maintain the specified concentration and will indicate a low oxygen alarm condition. Therefore sealing the enclosure at high oxygen concentration levels is important.

When the enclosure is opened, oxygen concentration levels rapidly deplete. To react to such a situation, the ServO₂ system uses an oxygen boost system to quickly return the environment to the specified level. The boost automatically turns on when demand is highest, and turns off when the actual concentration level nears the specified level. (It is important to point out that with the unit at its highest setting and the chamber leaking at the greatest possible rate, it would take approximately 26 minutes to deplete a full E-type cylinder.)

In most cases, the ServO₂ will control oxygen concentration levels within incubators or similar large enclosures, and allows the nursing staff to dispense with headboxes. This reduces the number of changes in oxygen concentration that the patient would experience with the removal of its headbox. It also improves O₂ stabilization in headboxes/beds when incubators are not available or clinically indicated.

1/General Information

Control Panel

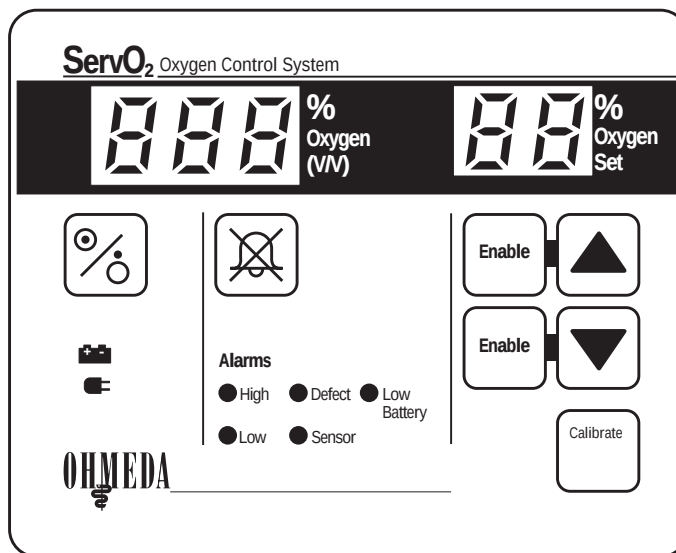


Figure 1-1
Control Panel

Controls



or



On/Stand by button. Press to turn unit on. Press again to turn unit off. A short delay has been set into the 'off' function to avoid inadvertent switch-off.

Note: The On/Stand by button does not control the electrical power supply. Whenever the ServO₂ system power cord is connected the internal battery is being charged.



Enable button. Used in conjunction with the ▲ or ▼ buttons to change the required oxygen concentration level.



Calibrate button. Used to check that the unit is within calibration. When the Calibrate button is pressed, the ServO₂ system automatically delivers 100% oxygen to the output tube and the Oxygen Set display goes blank. You must press the Calibrate button and the ▲ or ▼ buttons to change the calibration setting.



▲ & ▼ buttons. Used with Calibrate and Enable buttons to change the calibration and Oxygen Set point. Pressing the button changes the display by one digit. Holding the button in continuously changes the display one digit at a time.



Alarm silence button. Cancels the audible alarm on High O₂, Low O₂, and Low Battery alarms for a period of approximately 2 minutes, but the alarm indicator remains on. Sensor and Defect alarms cannot be silenced.

At the end of the alarm silence period the audible alarm will automatically resume if the alarm condition has not been resolved.

1/General Information

Displays



% Oxygen (V/V) display. Three digit display indicates the actual oxygen concentration level monitored by the oxygen sensor. This is displayed as a percentage of oxygen by volume(v/v).



% Oxygen Set display. Two digit display indicates the required oxygen concentration level set by the clinician. This is displayed as a percentage of oxygen by volume (v/v). When the environment is stable the Oxygen Set and Oxygen V/V displays should be within one digit of each other.



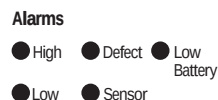
Battery indicator. When on indicates that the ServO₂ system is running from its internal battery.



Line indicator. When on indicates that the ServO₂ system is using power from the wall outlet. This is the normal mode of operation. This also indicates that the internal battery is being automatically recharged.

Alarms

High alarm indicator. Actual Oxygen concentration level is greater than 3% (v/v) above that displayed on Oxygen Set. Alarm condition immediately lights the High indicator on the front panel. After a delay period of 2 minutes (nominal) an audible alarm sounds. Both the visual indicator and audible alarm will automatically reset when the alarm condition is resolved.



Low alarm indicator. Actual oxygen concentration level is greater than 3% (v/v) below that displayed on Oxygen Set. Alarm condition immediately lights the Low indicator on the front panel. After a delay period of 2 minutes (nominal) an audible alarm sounds. Both the visual indicator and audible alarm will automatically reset when the alarm condition is resolved.

Immediately following first pressing the On/Stand by button the Low audible alarm is deactivated for approximately 2 minutes. This allows time for the gases to fill larger chambers such as incubators, avoiding unnecessary alarms.

Sensor alarm indicator. The oxygen sensor is disconnected or there is an open or short circuit in the sensor wiring. The indicator lights and the alarm sounds immediately, and cannot be silenced. The % Oxygen display reads "00" and the oxygen solenoid is automatically disabled.

Defect alarm indicator. Internal malfunction causes the indicator to light and the alarm to sound immediately. This alarm cannot be silenced. Oxygen supply is automatically disabled for safety purposes.

WARNING

⚠ Do not use the ServO₂ Oxygen Control System if a Defect alarm is indicated. The unit must be immediately removed from use and repaired.

Low Battery alarm indicator. Indicator lights immediately when the battery has only 7 minutes (nominal) remaining life. Delay of 2 minutes before the audible alarm sounds. The audible alarm can be silenced.

1/General Information

WARNING

⚠ If the low battery alarm remains unattended for a period of 7 minutes the ServO₂ Oxygen Control System will automatically turn itself off to prevent permanent battery damage. The internal battery is provided as an emergency back-up only.

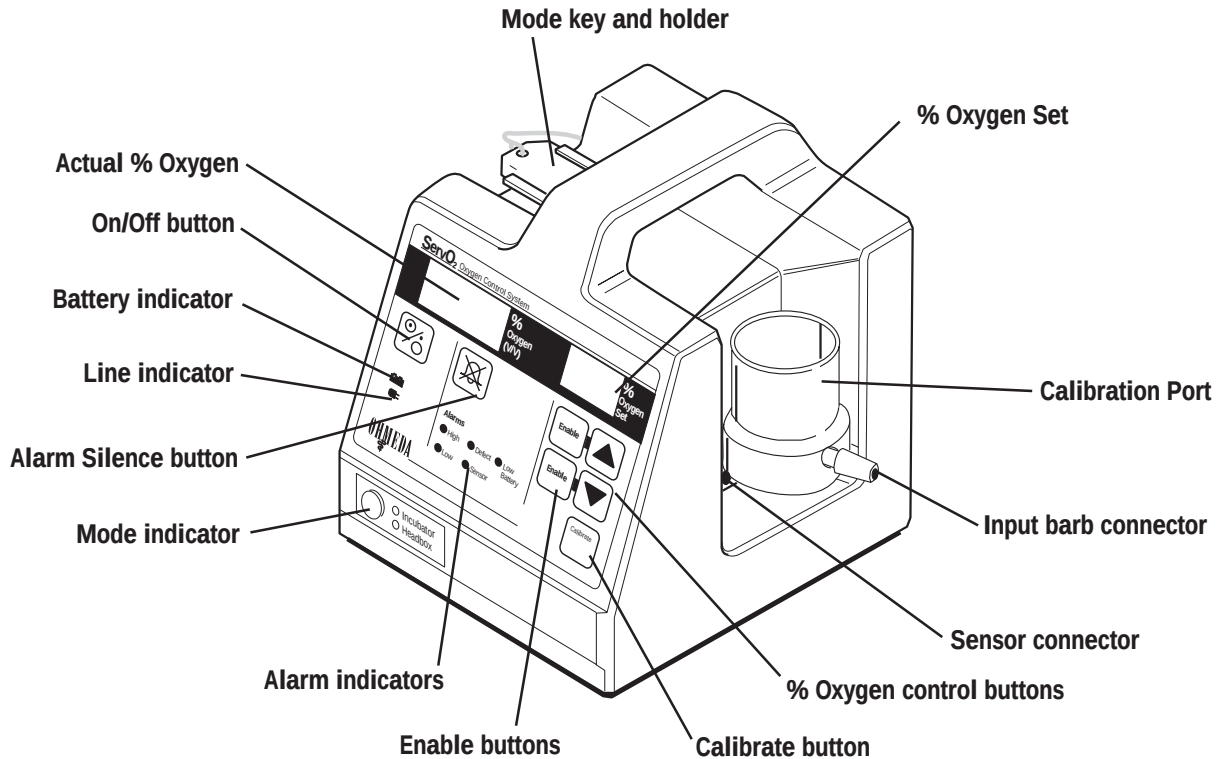


Figure 1-2
ServO₂ Oxygen Control System front view

Operating Modes

The ServO₂ system can work in either Incubator or Headbox mode.

Incubator mode. To put the unit in Incubator mode press the metal switch on the back of the unit (see Figure 1-3) and insert mode key into the slots. When connected to an oxygen or air supply, the mode indicator on the lower left front of the unit will show a series of red dots to indicate the Incubator mode.

Headbox mode. With the mode key removed (default) the unit is in low flow or headbox mode. The mode indicator on the lower left front of the unit will show a series of black dots (see Figure 1-2).

To put the unit back into Headbox mode simply remove the mode key. A holder located on the top of the unit is provided for the safe storage of the mode key.

1/General Information

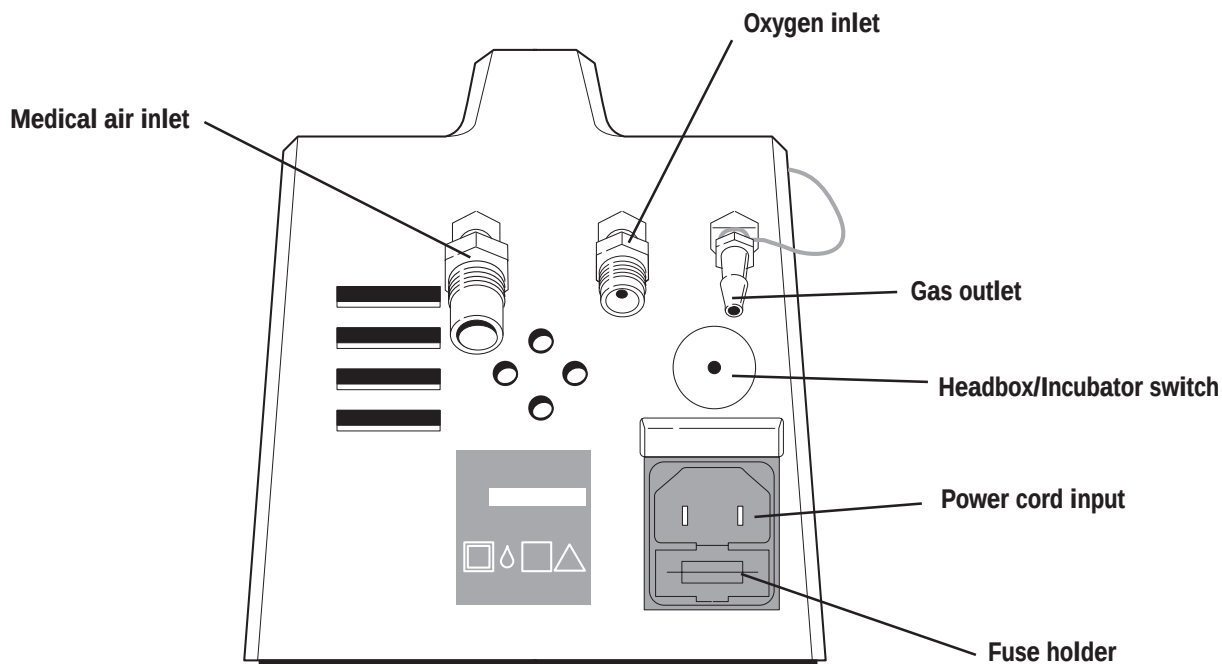


Figure 1-3
ServO₂ Oxygen Control System rear view

Mounting options

CAUTION

- ⚠ It is recommended that the ServO₂ Oxygen Control System be used in conjunction with a mounting bracket to prevent the unit from falling and being damaged.
-

There are two mounting options available:

Dovetail mounting bracket (fits rails used on Ohmeda equipment) 6600-0236-910
C-clamp/Universal rail mounting bracket (fits European style rails) 6600-0236-913

2/Operation

- WARNINGS

⚠

Do not perform the preoperative checkout procedure when the unit is being used with a patient.

⚠

Complete the “Preoperative Checkout ” section of this manual before putting the unit into operation. If the ServO₂ Oxygen Control System fails any portion of the checkout procedure it must be removed from use and repaired.

⚠

Oxygen concentrations higher than 40% can increase the risk of retrolental fibroplasia (retinopathy of prematurity). It is probable that even concentrations of 40% or less oxygen (formerly considered safe) could be dangerous to some infants. Therefore, arterial blood gas measurements are extremely important for regulation of the concentration of inspired oxygen when an oxygen-enriched environment is considered necessary. (See current edition of “Standards and Recommendations for Hospital Care of Newborn Infants” prepared by the Committee of Fetus and New-born of the Academy of Pediatrics.)

⚠

Do not use oil or oil bearing materials on or near the pneumatic parts of this unit. Oils and grease oxidize readily, and in the presence of oxygen, they will burn violently. The air and oxygen parts must be discarded if they are contaminated with oil or grease.

In this section

Preoperative checkout Procedure	2-1
Set-Up	2-2
Calibration	2-2
Calibration Schedule	2-2
Calibration Procedure	2-3
Using the ServO ₂ Oxygen Control System	2-3

Preoperative checkout procedure

1. Visually inspect the ServO₂ Oxygen Control System, its power cord and sensor cable for signs of damage.
2. Connect an oxygen supply to the unit, ensuring correct gas connection if no cross connection system is in use such as DISS or NIST. Turn the unit on and check that gas exhausts from the outlet barb on the back of the unit. Disconnect the oxygen supply.

2/Operation

3. Repeat step 2 with an air supply connected to the ServO₂ Oxygen Control System.
4. Connect both gas supplies to the unit. Turn the unit on. Press the mode switch on the back of the unit and check that the flow rate increases (there will be an audible difference in sound level). When the mode switch is depressed and the unit is connected to a gas supply, check that the mode indicator on the front of the unit shows red dots.
5. Disconnect the sensor to verify that the sensor indicator lights and that the alarm sounds. Reconnect the sensor and verify the alarm is silenced and the indicator goes out.
6. Unplug the unit's power cord and verify that the battery indicator lights and that the unit continues to function on battery power.
7. Calibrate the unit according to the instructions in Calibration in this section.

Set-up

1. Connect the Sensor cable to ServO₂ Oxygen Control System.
2. Install the appropriate air and oxygen connections to the 1/8" NPT fittings on the back of the unit.
3. Connect oxygen and air supplies to the inlets on the back of the unit (See Figure 1-3). Gas supplies greater than 65 PSI require high pressure ServO₂ units (see page 5-4 in section 5/Illustrated Parts).
4. Plug the power cord into the wall outlet. Check that the Line indicator is lit on the front panel (See Figure 1-1).
5. Connect an appropriate length of tubing to the output connector at the rear of the device (See Figure 1-3).
6. Place the unit within 6 feet (2 meters) of the incubator/cot to keep the sensor cable from being strained.

CAUTION

- ⚠ It is recommend that the ServO₂ Oxygen Control System be used in conjunction with a mounting bracket to prevent the unit from falling and being damaged.
-

Calibration

Calibration Schedule

Calibrate the ServO₂ system and its integral oxygen sensor according to the following schedule:

- Before the equipment is first put into use.
- Before the equipment is used immediately following an extended period of storage.
- Once every 24 hours when the ServO₂ system is in constant use.

2/Operation

Calibration Procedure

1. Place oxygen sensor securely into the calibration port .
2. Fit the distal end of the ServO₂ output hose (the end farthest away from the unit) securely over the input barb connector on the calibration port.
3. Press and hold the Calibrate button on the control panel. This will automatically blank out the “% Oxygen Set” display and deliver 100% Oxygen through the output hose. Press and hold the Calibrate button throughout the calibration procedure.
4. Allow approximately 20 seconds for the environment and sensor to stabilize.
5. While still pressing the Calibrate button, adjust the “% Oxygen (V/V)” display to read 100% by pressing the ▲ or ▼ button. If it does not read 100%, the sensor must be replaced.
6. When the display stabilizes at 100%, release all the buttons. Remove the sensor from the port and place it in the ambient air. Check that the “% Oxygen (V/V)” display reads 21% ($\pm 1\%$). If it does not, the sensor must be replaced.
7. Remove the output hose from the calibration port input barb and place it in the enclosure.

If a calibration port is not available the following is an alternative way to calibrate the unit.

1. Place oxygen sensor and the output tube from the ServO₂ system together in a small container such as a plastic bag.

CAUTION

- ⚠ Do not totally seal the container - excessive pressure may develop which can lead to incorrect calibration. Always use the gas output from the ServO₂ Oxygen Control System to calibrate the unit.

-
2. Press and hold the Calibration button on the front panel. This will automatically blank out the % Oxygen Set display, and deliver 100% oxygen through the output tube. Hold in the Calibration button throughout the calibration procedure.
 3. Allow approximately 20 seconds for the environment and sensor to stabilize.
 4. While still pressing the Calibration button, adjust the % Oxygen V/V display to read 100% by pressing either the ▲ or ▼ button.
 5. Release all buttons. Remove sensor from container and place in ambient air away from the delivery tube. Check % Oxygen (v/v) display now reads 21% ($\pm 1\%$).

Note: If the display cannot be adjusted to reach 100% or does not return to 21% ($\pm 1\%$), then the sensor must be replaced.

Using the ServO₂ Oxygen Control System

WARNINGS

- ⚠ **Fire hazard! Even material that will not normally burn will ignite readily and burn rapidly in high concentrations of oxygen. Keep all sources of ignition away from the incubator or headbox. Display “NO SMOKING” signs prominently.**

2/Operation

WARNING

- ⚠ **Spontaneous and violent ignition may occur if oil, grease or greasy substances come in contact with oxygen under pressure. Keep oil and grease away from regulators, cylinder valves, tubing and connections, and all other oxygen equipment.**
- ⚠ **Use only approved reducing or regulating valves marked for oxygen service on high pressure oxygen cylinders. Do not use valves for air or gases other than oxygen, since they may be hazardous when returned to oxygen service. Operate all oxygen equipment strictly in accordance with the manufacturer's directions.**
- ⚠ **High pressure oxygen and medical air equipment should always be located outside of the nursery. Securely fix cylinders in place so that they can not be knocked over while in use. Locate cylinders as far from the incubator or headbox as possible.**
- ⚠ **Use only equipment designed for use in hazardous locations in delivery rooms. Mixtures of oxygen and flammable vapors, such as alcohol, ether, ethylene and cyclopropane may explode if ignited. Electrical static spark discharges or high temperature surfaces, in addition to all other more common sources of ignition, may ignite these mixtures. Refer to Article 517 of the National Electrical Code, ANSI/NFPA 70, for the use of flammable anesthetics.**

1. Set-up the unit as described in Set-up section.
2. Perform the Preoperative checkout procedure.
3. Check calibration according to the calibration procedure.

Note: Before use the ServO₂ system can be checked by placing the sensor in air and ensuring the oxygen (v/v) display reads 21% ±1%.

4. Place the unit in either the Incubator or Headbox Mode.
5. Place ServO₂ system sensor in the patient chamber.

WARNING

- ⚠ **Do not place the Oxygen Sensor so close that it might obstruct the patient airway, and do not obstruct or cover the end of the oxygen sensor during use.**

6. Place the output tube in the patient chamber. Direct gas flow away from both the patient and the oxygen sensor. Using a deflecting device is recommended to ensure good gas circulation when using a headbox or canopy.
7. For incubators, connect the delivery tube to the oxygen inlet on the incubator or place it in the patient chamber so that it is in heated air flow coming up from within incubator.
8. Turn unit on by pressing I/O button. A set point of 21% will be displayed.
9. Press and hold the Enable button and adjust the % Oxygen Set display to the required oxygen concentration by pressing the ▲ button. Release all buttons.

2/Operation

10. The ServO₂ Oxygen Control System will now adjust the delivered gas to correct the difference between the oxygen concentration within the patient enclosure and the required level set by the user.

Note: The ServO₂ Oxygen Control System will easily control oxygen set point concentrations in the Care Plus Incubator between 40 and 50%. However, in the unlikely event that concentrations greater than 50% are desired, incubator conditions may prevent the ServO₂ unit from achieving these levels. To reach these higher set points use a headbox with the ServO₂ unit in the headbox mode, or add supplemental oxygen through the incubator's oxygen inlet port and adjust the flow rate as necessary.

3/Maintaining the ServO₂ Oxygen Control System

Cleaning and Disinfection

The ServO₂ Oxygen Control System has been specifically designed with chamfered edges and a minimum of sharp corners to reduce dirt traps.

The ServO₂ system can be cleaned by wiping down with a cloth and using a solution of water and a mild detergent. Use Cavicide® disinfecting cleaner to disinfect the unit.

CAUTION

⚠ Do not autoclave or expose the ServO₂ Oxygen Control System to temperatures or humidity outside its specifications. Do not immerse any part of the ServO₂ system.

4/Service Procedures

In this section

4.1	Repair Policy	4-2
4.2	Maintenance schedule	4-2
	Operator maintenance	4-2
	Service maintenance	4-2
4.3	Troubleshooting humidifier problems	4-3
4.4	Repair Procedures	4-4
	A. Base Control/PSU Board Removal	4-4
	B. Display Board Replacement	4-5
	C. Touch Panel Replacement	4-6
	D. Transformer Chassis Replacement	4-7
	E. Mains Fuse Replacement	4-7
	F. Manifold/Solenoid Assy Removal	4-7
	G. Filter Replacement	4-7
	H. Battery Replacement	4-8
	I. Input Sensor Cable replacement	4-8
	J. Mode Indicator Replacement	4-9
	K. IEC Inlet Receptacle Replacement	4-9
	L. Speaker Replacement	4-10
	M. Mode Selector Replacement	4-10
	N. Air/Oxygen/Blend Swivel Replacement	4-11
	O. Oxygen Sensor Cell Replacement	4-11
4.5	Service Calibration	4-12
	A. Calibration Set-up	4-12
	B. Calibration Amplifier - Voltage Offset Null	4-12
	C. Digitally Controlled Variable Resistor	4-12
	D. D to A Output Calibration	4-13
	E. High/Low Alarm Calibration	4-13
	F. Display DVM Calibration	4-14
	G. Battery Charge Rate Set	4-14
	H. Battery Charge Current Check	4-14
	I. Low Battery Alarm Threshold Calibration	4-14
	J. Calibration Re-assembly	4-14
4.6	Service Checkout Procedure	4-15
	A. Gas Flow Rate Check	4-15
	B. User Functions Check	4-15
	C. Alarm Check	4-16
	D. Control Check	4-17
	E. Electrical Safety Test	4-17

4/Service Procedures

4.1 Repair Policy

Warranty repair and service must be performed by an Ohmeda Service and Distribution Center. To contact an Ohmeda Service Representative, call the nearest Ohmeda Service Center listed on the back cover.

Do not use malfunctioning equipment. Make all necessary repairs or have the equipment repaired by an Ohmeda Service and Distribution Center. Parts listed in the manual, for this product, may be repaired or replaced by a competent, trained person who has experience in repairing devices of this nature. After repair, perform all applicable check procedures described in the manual.

WARNING

⚠ **Do not use oil or oil bearing materials on or near the pneumatic parts of the unit. Oils and grease oxidize readily, and in the presence of oxygen, they will burn violently. The air or oxygen parts must be discarded if they are contaminated with oil and grease.**

CAUTIONS

- ⚠ Only competent individuals trained in the repair of this equipment should attempt to service it as detailed in the manual.
- ⚠ Detailed information for more extensive repairs is included in the manual solely for the convenience of users having proper knowledge, tools and test equipment, and for service representatives trained by Ohmeda.

4.2 Maintenance schedule

The unit should be maintained in accordance with the procedures detailed in the manual. Quarterly and yearly maintenance must be performed by a technically competent individual as described in the Repair Policy.

Operator maintenance

This schedule lists the minimum frequencies. Always follow hospital and local regulations for required frequencies.

Daily or before each patient	Calibrate the ServO ₂ Oxygen Control System (see section 2, Operation).
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Service maintenance

This schedule lists the minimum frequencies. Always follow hospital and local regulations for required frequencies.

Every six months	Perform the service checkout and electrical safety procedure in this section.
Every year	Replace filters. Perform service calibration in this section
Every two years	Replace the battery.

4/Service Procedures

4.3 Troubleshooting ServO₂ Oxygen Control System problems

Symptom	Possible cause(s)	Recommended action(s)
Oxygen display reads 00, Sensor indicator on and non-silencable alarm sounds	Sensor cable is broken, disconnected or short circuit	Connect or replace the sensor cord assembly
Defect indicator on and non-silencable alarm sounds	Electrical failure or short circuit	Remove unit from use contact service
Setpoint can not be adjusted	Not pressing Enable and ▲ or ▼ at the same time	Verify you press Enable and ▲ or ▼ at the same time
	Electronic fault	Remove unit from use contact service
ServO ₂ system can not reach and maintain the desired setpoint	Sensor not in the patient chamber or sensor is covered Gas delivery tube is not in the patient chamber	Verify that the delivery tube and sensor are placed in the patient chamber
	Oxygen is not connected	Check that the O ₂ connection is secure
	Oxygen and air lines misconnected	Check connection
	Setpoint selected is too high for the enclosure being used. ServO ₂ system has a maximum flow rate determined by the mode selected . It can not compensate for leakage rates greater than this.	Reset setpoint to a level that enables stabilization and/or Limit leakage from incubator or head hood. Check that tubing access covers, porthole seals, incubator controller seals, humidifier seals and tray are in place and in good condition.
	Incubator door or portholes left open too long	Close doors. If clinical procedures require doors or porthole be open for extended periods, use head box or porthole sleeves.
	Internal leak in unit	Remove unit from service and check for leaks
	Mode switch not fully engaged	Remove mode key, make sure you press the switch button all the way in, then re-insert mode key. If problem persists, re-adjust switch
	ServO ₂ controller in wrong mode	Change mode
Actual oxygen concentration level oscillates around set point	Delivery tube output to close to sensor	Re-position tube
Can not calibrate at 100% oxygen	Sensor failure or depletion	Replace sensor
After calibration at 100% oxygen, sensor does not display between 20 and 22%	Defective sensor	Replace sensor
Unit in incubator mode, but indicator shows Headbox mode or is not fully in Incubator mode position	Due to infrequent use lubricant solidified	With unit in incubator mode, and O ₂ at 100%, pinch out tube to make back pressure and free up indicator

4/Service Procedures

4.4 Repair Procedures

WARNING

- ⚠ Before any disassembly or repair, disconnect the electrical and any gas supply connections. Do not perform any service or maintenance with the power applied unless specifically told to do so in the procedure.
- ⚠ After each repair procedure, perform the service checkout procedure.

CAUTION

- ⚡ Use a Static Control Work Station (0175-2311-000) for all procedures marked with the symbol ⚡ to help ensure static charges are safely conducted to the ground. The Velostat material is conductive. Do not place electrically powered boards on it.

Important: In cases where total disassembly is not required, replacing only the touch panel for example, perform only the necessary steps.

Wire Harness Table

harness	board position	wire colors
transformer secondary harness	PL4	2 black wires
battery harness	BATT	2 black & 2 red wires
speaker harness	PL2	1 black, 1 red, 1 green, & 1 yellow wire
sensor input harness	INPUT	1 red & 1 blue wire
display harness	PL1	34 wire ribbon cable
solenoid harness	PL3	6 red wires

Equipment needed:

Phillips screw driver #2
Small flat blade screwdriver
T-10 Torx driver (provided in service kit)
95° T-10 Torx driver (provided in service kit)
11mm socket wrench
8mm open end wrench
6mm open end wrench
Rubber gloves or two small sheets of rubber
1/4" dia. dowel rod
Wire cutters
50 - 60 psi (3 -4 bar) static gas pressure source

⚡ A. Base and Control/PSU board Removal

(Refer to Figures 4-1 & 4-2)

1. Place the unit on its side with the oxygen sensor facing up and the base facing you.
2. Remove the six Phillips head mounting screws that secure the base to the case.
3. Remove base cover taking care not to stress tubing and cable attached to the manifold/solenoid assembly attached to the base.

4/Service Procedures

4. Remove the three color coded luer locks that attach the tubes to the manifold.
5. Press the release clip and slide the board partially out to gain access to wire harness connectors.

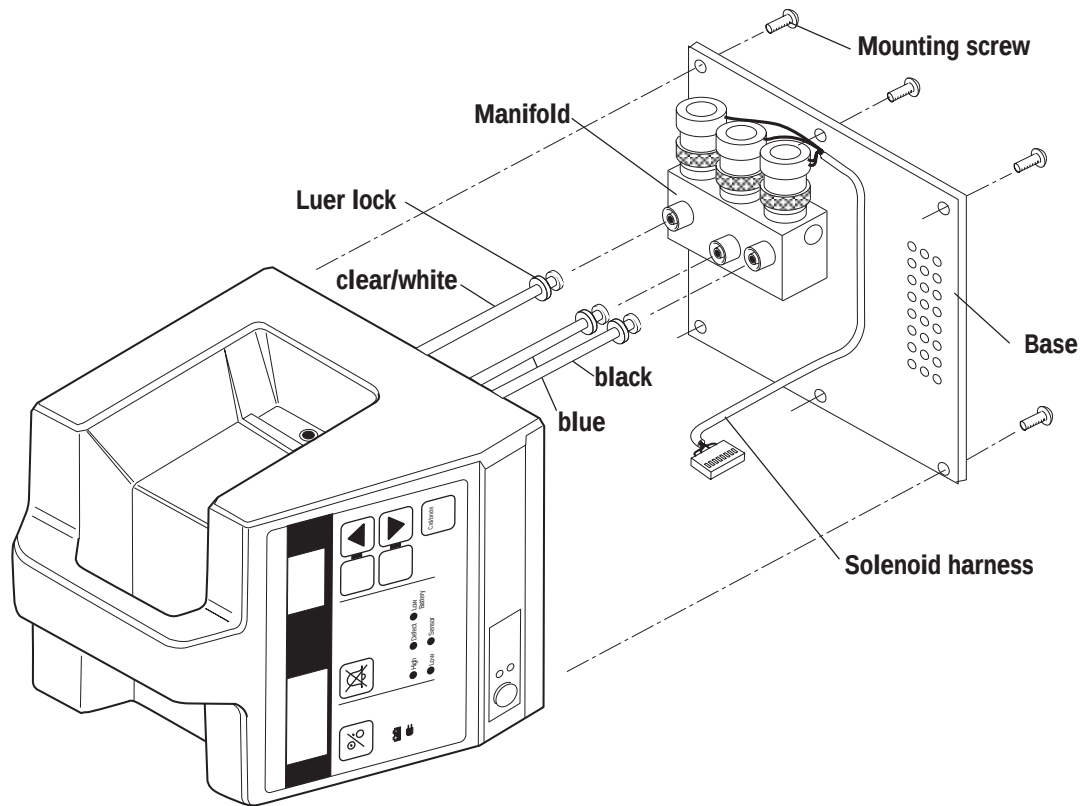


Figure 4-1
Removing base

6. Disconnect the transformer secondary harness, the battery harness, the speaker harness, the sensor input harness, the display ribbon cable and the solenoid harness.
7. Remove the control/PSU board assembly.
Note: To disconnect the display ribbon cable use a small flat blade screwdriver. Place the blade into the connector indexing slot and pry the connectors apart.
8. To separate the control board from the PSU board remove the four T10 Torx screws that secure control board to the PSU board and separate the boards. Take care not to excessively flex either board.
9. To replace either the PSU board or the control board, perform steps 1 through 8 in reverse.

4/Service Procedures

ⓧ B. Display Board Replacement

(Refer to Figure 4-2)

1. Remove the base and the control/PSU board assembly to gain access to display board (see section 4.4A Base and Control/PSU assembly Removal).

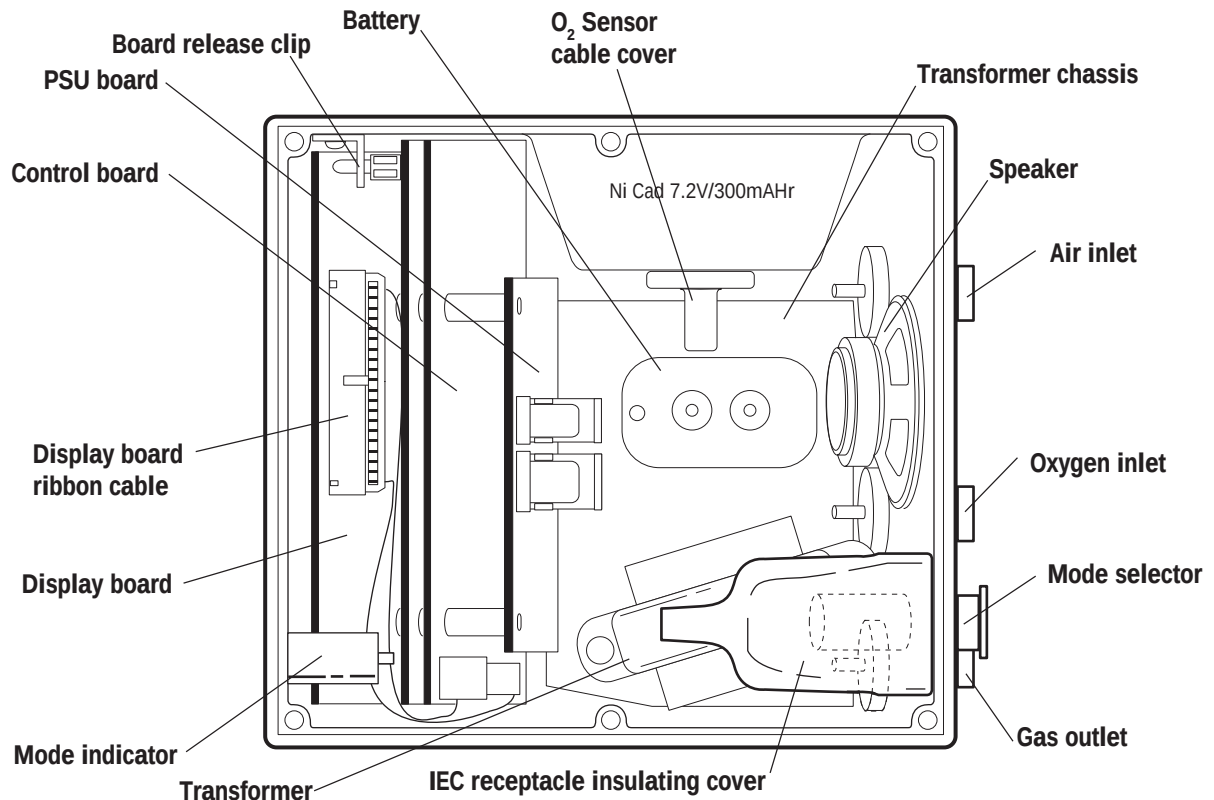


Figure 4-2
Interior view

2. Remove the transformer chassis.
3. Using a 95 degree T-10 Torx driver, remove the two mounting screws located at the top of the display board.
4. Using a straight T-10 Torx driver, remove the two mounting screws located at the bottom of the display board.
5. Disconnect touch panel ribbon cable from display board connector located on the solder side of display board and carefully separate the display board from case.
6. To replace the display board, perform steps 1 through 5 in reverse.

ⓧ C. Touch Panel Replacement

1. Peel touch panel off the case.

Note: Prior to installation of a new touch panel, insure the case is clean for the panel to properly adhere. It is important that the touch panel properly adheres to the case to help protect the unit from spills.

2. Disconnect the ribbon cable from the touch panel.

4/Service Procedures

3. Connect the ribbon cable to the new touch panel.
4. Apply new panel label to the case.

ⓧ D. Transformer Chassis Replacement

(Refer to Figure 4-2)

1. Remove the base and the control/PSU board assembly to gain access to the transformer chassis (see section 4.4A Base and Control/PSU Board Removal).
2. To remove the A.C. mains wiring from the IEC inlet receptacle, slide the insulating cover off the receptacle, remove the faston connectors, and remove the mains wiring from the cover.
3. Remove the three T-10 Torx screw that hold the transformer chassis to the case, and carefully remove the chassis from case.
4. To replace the transformer chassis, perform steps 1 through 3 in reverse.

E. Mains Fuse Replacement

1. Use a straight blade screw driver to pry off fuse cover from IEC receptacle located on rear of unit (see Figure 1-3).
2. Replace the fuse with a fuse of the same rating.

ⓧ F. Manifold/Solenoid Assembly Removal

1. Remove the base and the control/PSU board assembly to gain access to the manifold/solenoid assembly (see section 4.4A Base and Control/PSU Board Removal).
2. Peel the service warning label off the bottom of base to expose the two mounting screws on the outside of the base.

Note: A new label must be applied.

3. Remove the two Phillips head mounting screws that hold the manifold/solenoid assembly to the base and remove the assembly.
4. Install the new manifold/solenoid assembly with the two Phillips screws removed in step 3 and apply a new service warning label to the base.
5. Re-assemble the unit by reversing steps 1 through 7 in section 4.4A Base and Control/PSU Board Removal.

ⓧ G. Filter Replacement

1. Remove the base and the control/PSU board assembly (see section 4.4A Base and Control/PSU Board Removal).

4/Service Procedures

2. Use a 11mm socket or box wrench to remove the black and the white plastic 1/8 NPT screws from the side of the manifold. Remove any debris from the filter chambers before removing the filters. This can be done by directing high pressure air into the chambers. Be sure to wear eye protection while using air pressure to clean the filters.
3. To remove the two filters from within the manifold, lightly tap the manifold from the reverse side or use a small curved pick.
4. Install new filters and re-install the black and the white plastic 1/8 NPT screws.
5. Re-assemble the unit by reversing the steps in section 4.4A Base and Control/PSU Board Removal.
6. Install a new output barb.
7. Remove the NIST fittings and replace filters. When re-installing the fittings, use de-greased PTFE tape (6600-0041-300) to seal them.
8. Perform service checkout procedure.

ⓧ H. Battery Replacement

(Refer to Figure 4-2)

1. Remove the base and the control/PSU board assembly to gain access to the transformer chassis (see section 4.4A Base and Control/PSU Board Removal).
2. Remove the transformer chassis (see section 4.4D Transformer Chassis Removal).
3. Remove the two plastic knurled nuts that secure the battery and battery holder to the transformer chassis.
4. Install the new battery and reverse steps 1 through 3 to re-assemble the unit.

ⓧ I. Input Sensor Cable Replacement

(Refer to Figure 4-2)

1. Remove the base and the control/PSU board assembly (see section 4.4A Base and Control/PSU Board Removal).
2. Remove the black insulation from the case connector.
3. Remove the case connector and harness.
4. Slide the black housing off the wire and connector.
5. Remove the inlet connector and wire from the unit.
6. Install the new sensor cable.
7. Re-assemble the unit reversing steps 1 through 6.

4/Service Procedures

J. Mode Indicator Replacement

1. Remove the base and the control/PSU board assembly (see section 4.4A Base and Control/PSU Board Removal).
2. Disconnect the blue tubing from mode indicator.
3. Unscrew the 90 degree plastic tubing connector from the mode indicator.
4. Unscrew the black housing from the mode indicator.
5. Push on the rear of the mode indicator to loosen the label enough to peel it off.

Note: A new label must be installed.

6. Remove the mode indicator.

Note: Before installing a new mode indicator, clean the label area to ensure adhesion of the new label.

7. Install a new mode indicator and label.
8. Re-assemble the unit by reversing the steps in section 4.4A Base and Control/PSU Board Removal.
9. To adjust the mode selector switch:
 - a) Using a 1.5 mm hex key, remove the first of the two set screws in the hole in the center of the switch.
 - b) While pushing the switch all the way in, adjust the second set screw until the mode key locating groove aligns with the groove in the mode selector housing.
 - c) Re-install the first set screw to lock in the adjustment setting. Check that the adjustment does not change.
 - d) Check that the mode key fits smoothly into the slot when the Incubator mode is selected.
 - e) Check that when the mode key is in the slot there is no free play in the mode selector (if there is, the selector switch may not have been pressed all the way in when the adjustment was made).

ⓧ K. IEC Inlet Receptacle Replacement

(Refer to Figure 4-2)

1. Remove the base and the control/PSU board assembly (see section 4.4A Base and Control/PSU Board Removal).
2. Slide the insulating cover off the back of the IEC receptacle.
3. Pull off the Faston connectors to disconnect the brown and blue wires from the IEC receptacle.
4. Depress the locking tabs on both sides of the receptacle, and remove the receptacle.
5. Install the new receptacle. When re-installing the wiring, the brown wire is connected to phase and the blue wire is connected to neutral. The neutral tab on the receptacle is identified by an 'N' next to the connector.
6. Re-assemble the unit by reversing the steps in 4.4A Base Removal.

ⓧ L. Speaker Replacement

(Refer to Figure 4-2)

1. Remove the base and the control/PSU board assembly to gain access to the speaker harness (see section 4.4A Base and Control/PSU Board Removal).
2. Disconnect the speaker harness.
3. Using a 95° T-10 Torx driver, loosen the screw that secures the speaker mounting bracket and rotate the speaker mounting bracket.
4. Remove the speaker.
5. Install the new speaker, making sure the speaker seats in the top grooves.
6. Tighten the T-10 screw that holds the speaker mounting bracket in place.
7. Re-assemble the unit by reversing the steps in section 4.4A Base and Control/PSU Board Removal).

ⓧ M. Mode Selector Replacement

1. Remove the base and the control/PSU board assembly (see section 4.4A Base and Control/PSU Board Removal).
2. Remove IEC receptacle (see section 4.4K IEC Receptacle Replacement).
3. Remove transformer chassis (see section 4.4D Transformer Chassis Replacement).
4. Disconnect the tubing from the mode selector.

Note: Refer to the pneumatic circuit diagram in section 6 for installation of tubing.

5. Remove the tubing connector guard from the mode selector.
6. Using a 8mm open end wrench, remove the diverting valve assembly.

Note: Be careful not to damage the tubing connectors.

Note: The mounting hardware and selector knob are secured to the outside of the case and do not need to be removed.

7. Install a new mode selector by reversing steps 4 through 6.
8. Re-assemble the unit reversing steps 1 through 3.

ⓧ N. Air/Oxygen/Blend Swivel Replacement

1. Remove the base and the control/PSU board assembly (see section 4.4A Base and Control/PSU Board Removal).
2. Remove IEC receptacle (see section 4.4K IEC Receptacle Replacement).
3. Remove transformer chassis (see section 4.4D Transformer Chassis Replacement).
4. Using a 6mm open end wrench, remove the hose and hose connector from the swivel mount.

4/Service Procedures

5. Remove plastic swivel cap.
6. Remove the E-clip that holds the swivel to the case and remove the swivel.
7. Install new swivel by reversing steps 4 through 6.

Note: Be certain to re-install the plastic swivel connector.

Note: Do not over tighten the hose connector.

8. Re-assemble the unit reversing steps 1 through 3.

O. Oxygen Sensor Cell Replacement

1. To disconnect the oxygen sensor, grasp the connector located on the side of the unit at its knurled sleeve. Slide the sleeve away from the unit and pull the connector out.
2. The sensor assembly has a friction fitted housing. There is a groove in the middle of the housing where its two halves connect. To disassemble the housing, grasp the top of the housing in one hand and the bottom in the other, then pull and snap the two halves apart. Chemical residue or debris may cause the housing halves to stick, so it may be necessary to twist the housing one quarter turn and pull the housing apart. If the housing does not fully separate, twist a quarter turn in the reverse direction. Continue twisting back and forth in quarter turns until the housing halves separate. It may help to use rubber gloves or sheets of rubber to improve your grip. Using a tool like a pliers or a wrench may damage the housing and is not recommended.
3. Disconnect the wires from the oxygen sensor cell: the blue wire is connected to the center pin and the red wire is connected to the outer pin of the sensor.
4. The oxygen cell is a friction fitted assembly. To remove the oxygen cell, apply slight pressure to the face of the cell. Chemical residue and debris may cause the oxygen cell to stick. A 1/4" dia. dowel rod can be used to apply pressure to the face. Do not use a sharp tool like a screw driver since it may damage the housing.

WARNING:

- ⚠ **The sensor may release quickly. Do not direct the oxygen cell, dowel rod and housing toward any person.**
-

5. Install the new cell. Place the front of the sensor housing nose down on a firm surface to avoid fracturing the housing while installing the O₂ cell. Re-assemble reversing steps 1 through 4.

⊗ 4.5 Service Calibration

(Refer to Figure 4-3 for calibration test points)

Equipment needed:

Digital Voltmeter (mV resolution)

Display board IDC extension cable (provided in service kit)

Adjustable DC Voltage source (35mA min.)

Millivolt source (0 to 50mV) (provided in service kit)

Pot adjustment screwdriver

4/Service Procedures

A. Calibration Setup

1. Remove the base and the control/PSU assembly according section 4.4A.
2. Lift the PSU board away from the control board. Electrically re-connect the PSU board and control boards using the 14 pin extension cable. Note the polarity of the connector; be sure that the red stripped wire is connected to the same pins. Rest the Control and PSU boards on the bench next to the case.
3. Re-connect the ac supply (PL4) and the dc battery supply (BATT) to the PSU board and the display board ribbon cable with the extension wire harness to the display board. Note the polarity of the connector; be sure that the red stripped wire is connected to the same pins.
4. Connect the simulator to INPUT terminals on the control board. Set the switch on the simulator to the down position. Re-connect the AC power cord. Switch on ServO₂ unit using the control panel button.

B. Calibration Amplifier - Voltage Offset Null

1. Using a voltmeter monitor between Test point 13 (TP13) and Test Pin 1 on the Control board, short pins 2 and 3 of IC8.
2. Adjust VR1 on the control board until monitored voltage just flips between the positive (+5V) and negative rails (-5V).

C. Digitally Controlled Variable Resistor

1. Using the control panel buttons (CAL & ▼), set the user calibration setting to minimum (ie, when the % Oxygen display settles at a value below which it will not move).
2. Monitor TP1 with respect to TP13. Adjust the mV input until TP1 measures 1.000V.
3. Monitor TP2 with respect to TP13 without changing the mV input setting.
4. Adjust VR2 on control board until the voltage on TP2 is 0.500V

D. D to A Output Calibration

1. Adjust the control panel buttons (ENABLE and ▲) to display a setpoint of 50%.
2. Monitor TP4 with respect to TP13. Adjust VR5 until the voltage on TP4 is 1.000V

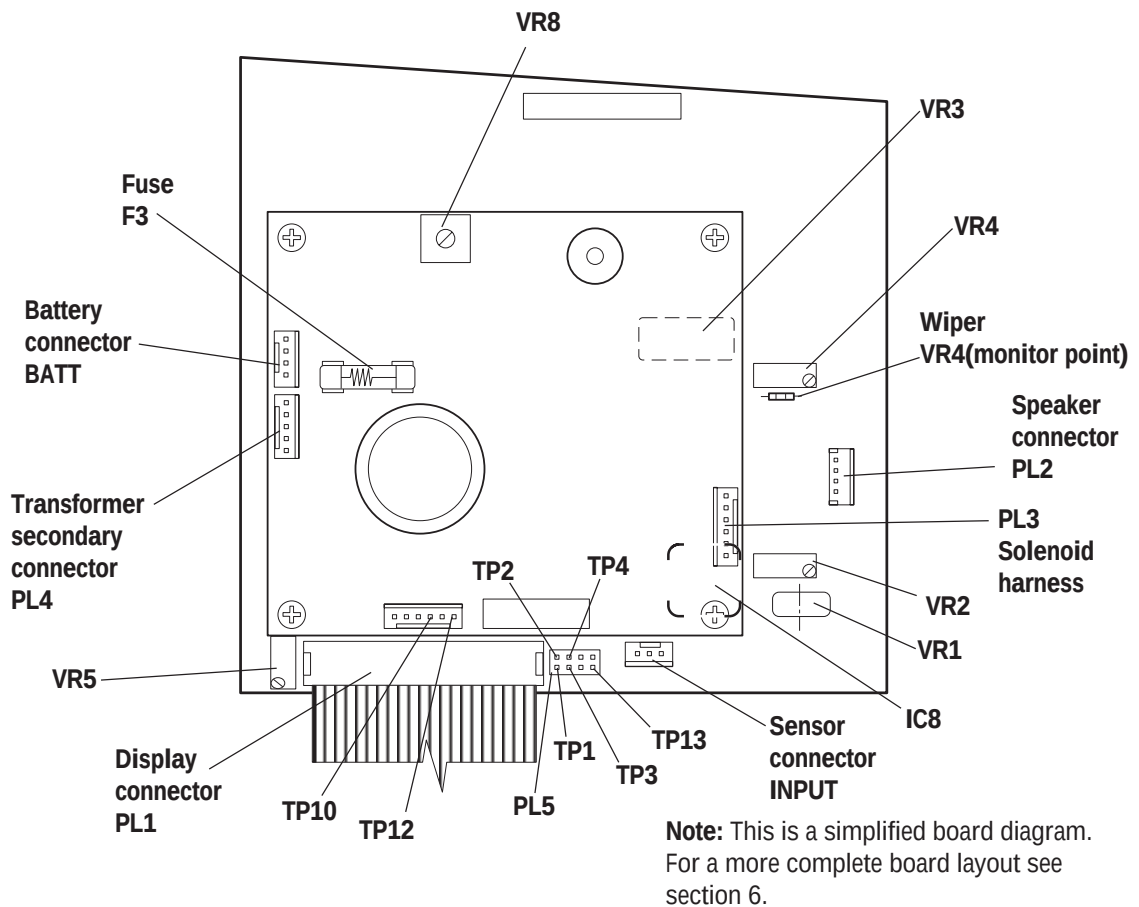


Figure 4-3
Control/PSU board assembly test points

E. High/Low Alarm Calibration

1. With the setpoint at 50%, check that TP4 is 1.000V.
2. Set the mV input so that TP3 is 1.000V with respect to TP13.
3. Monitor VR4 wiper (R47) with respect to TP13. Adjust VR4 until the monitored voltage equals 0.600V.
4. Monitor the front display. Adjust the mV input slowly to check that the High and Low alarms activate between 2 - 4% from the setpoint respectively.

F. Display DVM Calibration

1. Monitor TP3 with respect to TP13.
2. Using the control panel buttons (CAL and ▲) set user calibration to maximum.
3. Set mV input such that TP3 is 1.990V.
4. Adjust VR1 on Display board until ServO₂'s display just changes from 99 to 100 oxygen.

4/Service Procedures

G. Battery Charge Rate Set

1. Monitor TP12 (power board PL6) with respect to TP13.
2. Ensure the battery is connected.
3. Adjust VR8 on the PSU board until TP12 is 9.20V.

H. Battery Charge Current check

Allow new batteries 5 minutes charge prior to performing this test. Monitor TP12 with respect to TP10. With the battery connected and charging, the monitored voltage should be in the range 0.37 and 0.76V (depending upon the battery terminal voltage). If batteries fails check replace it.

I. Low Battery Alarm Threshold Calibration

1. Remove Secondary ac wire harness connector (PL4) and replace the battery dc wire harness connector (BATT) with a variable dc power supply (minimum 35 mA capacity).
2. Monitor this input voltage.
3. Adjust input voltage to 6.90V. Adjust VR3 on control board until Low Battery alarm indicator just lights. Raise input voltage to 7.25V. The indicator should go out.

J. Calibration Re-assembly

Disconnect all test harnesses and re-assemble unit performing steps 1 through 3 of 4.5A Calibration Set Up in reverse.

4.6 Service Checkout Procedure

Equipment needed:

Calibration port

Medical air and oxygen supply 50 -60 PSI (3-4 bar)

Graduated flowmeter 0 to 20 lpm

Oxygen bubble tubing (or equivalent)

Incubator/Headbox/Electronic Load Simulator (provided in the service kit)

The ServO₂ system incorporates a pneumatic switch, accessible by the user, to shift from Incubator (high flow) to Headbox (low flow) mode as necessary.

Connect electrical mains and gas supplies to the ServO₂ unit.

4/Service Procedures

A. Gas Flow Rate Check

Note: To achieve the output flow rate specified in the appendix, this flow rate check requires a pressure of 3.99 bar for both medical air and oxygen supplies.

1. Connect a graduated flowmeter to the output connector of the ServO₂ unit using the bubble tubing.
2. Switch the ServO₂ unit on using the control panel button.
3. Set the ServO₂ unit for the Incubator mode.
4. Adjust the setpoint to 22 % and place the sensor in ambient air (ie, reading 21%).
5. Remove the medical air gas supply and check that the flow rate indicated by the flowmeter reads between 12 and 15 lpm while the oxygen solenoid valve is open.

Note: For the Headbox mode the normal oxygen and air flow rates are between 5 and 7 lpm; the auxiliary oxygen solenoid has no appreciable affect.

6. Increase the setpoint to >24% to open the auxiliary oxygen solenoid valve and check that the flow rate reads between 17 and 20 lpm.
7. Remove the oxygen gas supply and re-connect the medical air gas supply.
8. With the setpoint adjusted to 21% and the user calibration set such that the actual oxygen display reads >22%, check that the flowmeter reads between 12 and 15 lpm while the air solenoid valve is open.
9. Re-connect the oxygen gas supply.

B. User Functions Check

1. Place oxygen sensor securely into the calibration port.
2. Fit the distal end of the ServO₂ out put hose (the end farthest away from the unit) securely over the input barb connector on the calibration port.
3. Press the Calibrate button on the control panel. This will automatically blank out the "% Oxygen Set" display and deliver 100% Oxygen through the output hose. Press and hold the Calibrate button throughout the calibration procedure.
4. Allow approximately 20 seconds for the environment and the sensor to stabilize.
5. While still pressing the Calibrate button, adjust the "% Oxygen (V/V)" display to read 100% by pressing the ▲ or ▼ button. If it does not read 100%, the sensor must be replaced.
6. When the display stabilizes at 100%, release all the buttons. Remove the sensor from the port and place it in ambient air. Check that the "% Oxygen (V/V)" display reads 21% (± 1%). If it does not, the sensor must be replaced.

C. Alarm Check

1. Disconnect the sensor cable and check that the Sensor alarm indicator lights and audible alarm sounds immediately.
2. Check that the alarm can not be silenced by pushing the alarm silence button.
3. Re-connect the sensor cable assembly.
4. Using blended output fed directly back to the sensor, simulate and maintain a high Oxygen condition (3% above setpoint).
5. Check that the High alarm indicator lights immediately and that after 2 minutes the audible alarm sounds.
6. Check that this alarm can be silenced by pushing the alarm silence button.
7. Disconnect gas supplies.
8. Increase the setpoint to simulate a Low oxygen alarm condition (3% below setpoint).
9. Check that the Low alarm indicator lights immediately and that after 2 minutes ($\pm$ 10 seconds) the audible alarm sounds.
10. Check that the alarm can be silenced by pushing the alarm silence button.

Note: Before performing the battery life test, connect the ServO₂ unit to a mains electrical supply for 24 hour to ensure that the battery is fully charged.

11. With setpoint at 21% and sensor in ambient air (ie, reading 21%) the Normal Air and Oxygen solenoids will begin to cycle. Unplug the unit and check that the it continues to run on battery with no corruption of displays during the change-over period.
12. Leave the unit running until the Low Battery alarm indicator lights. If the battery does not operate for at least 60 minutes it should be replaced.
13. Using the alarm silence button, silence the alarm after it sounds.
14. Check the unit turns itself off at least 6 minutes after the indicator comes on.
15. Re-charge the battery before putting the unit back in service.

D. Control Check

The control check can be done either by setting up the ServO₂ unit to control oxygen in an incubator, or by using an electronic load simulator. This dummy load simulates an input to the ServO₂ unit and is affected by the ServO₂ unit's electrical output. The simulator allows testing to be completed on the bench.

Incubator

1. Connect the gas supplies, electrical mains supply and gas output tube to the ServO₂ unit.
2. Connect the gas output tube from the ServO₂ unit to the incubator.
3. Place the sensor on the incubator mattress.
4. Switch the unit on using the I/O control panel button and adjust setpoint to 40%.
5. Check that the ServO₂ unit controls the incubator to within $\pm 1\%$ of setpoint.

Note: The incubator should be operating to ensure good gas circulation.

Electronic Load Simulator

1. Connect the load simulator to the INPUT connector on the Control board and the Solenoid connector on the PSU board (PL3).
2. Adjust setpoint to 50%.
3. Check that unit controls within $\pm 1\%$ of setpoint.

E. Electrical Safety Check

Enclosure leakage current

Use approved equipment and techniques to test the unit's enclosure leakage current. Follow the directions supplied by the test equipment manufacturer to verify the following:

1. Normal condition: Less than 100 microamperes*.
2. Single fault condition (interruption of one supply conductor): Less than 300 microamperes*.

* Tested as a double insulated device with an insulated enclosure.

5/Illustrated Parts

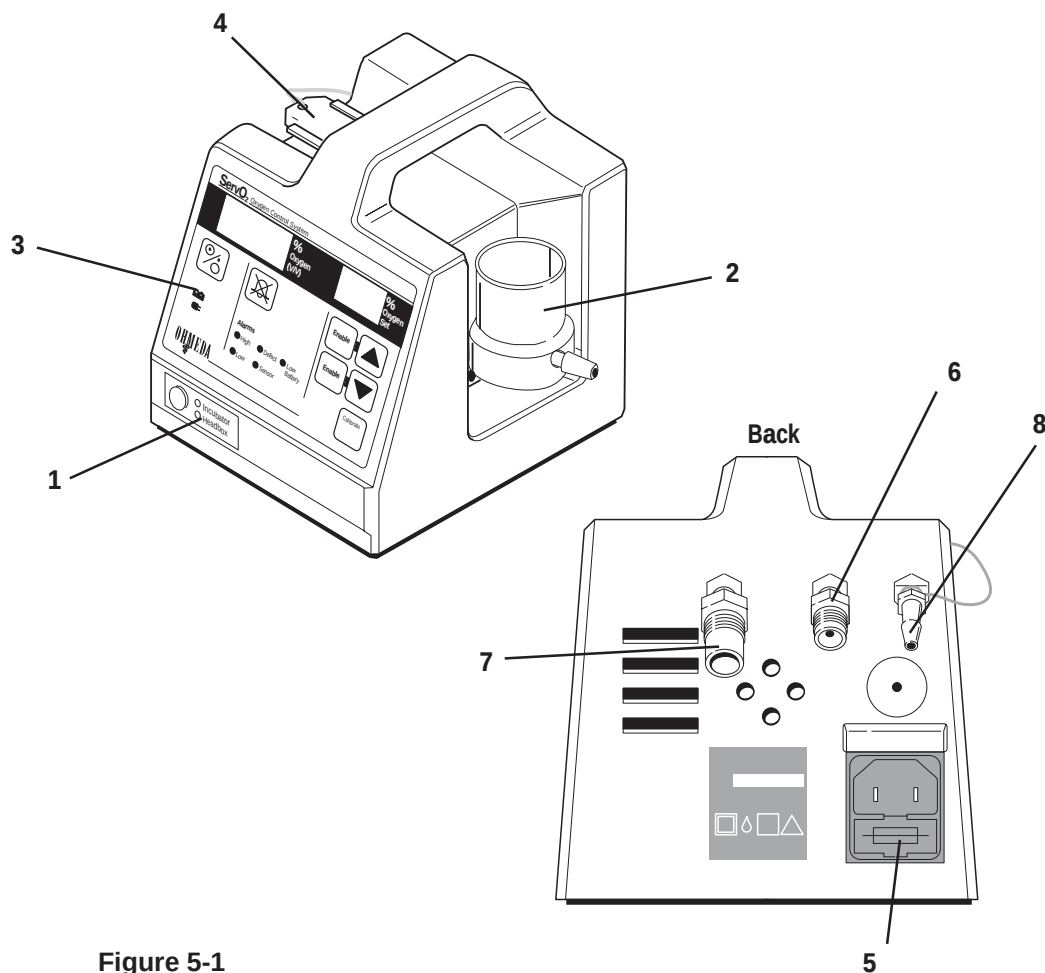


Figure 5-1
Exterior parts

Item	stock number
1. Incubator/headbox label	6600-0696-223
2. Calibration port	6600-0696-246
3. Membrane switch panel	6600-0696-230
4. Mode key with cord	6600-0696-225
5. Fuse	6600-0696-237
6. Swivel elbow, air (includes cover, DISS connector and barb)	6600-0696-204
(includes cover, NISTconnector and barb)	6600-0696-253
7. Swivel elbow, O ₂ (includes cover, DISS connector and barb)	6600-0696-205
(includes cover, NIST connector and barb)	6600-0696-254
8. Swivel elbow, blend (includes cover and barb)	6600-0696-206
Parts not shown	
Label kit (complete)	6600-0696-224
Rubber feet (four)	6600-0696-229
Power cord, 240V	6600-0696-235
Sensor cable(with out sensor)	6600-0696-242
O ₂ Sensor	6600-0696-209

5/Illustrated Parts

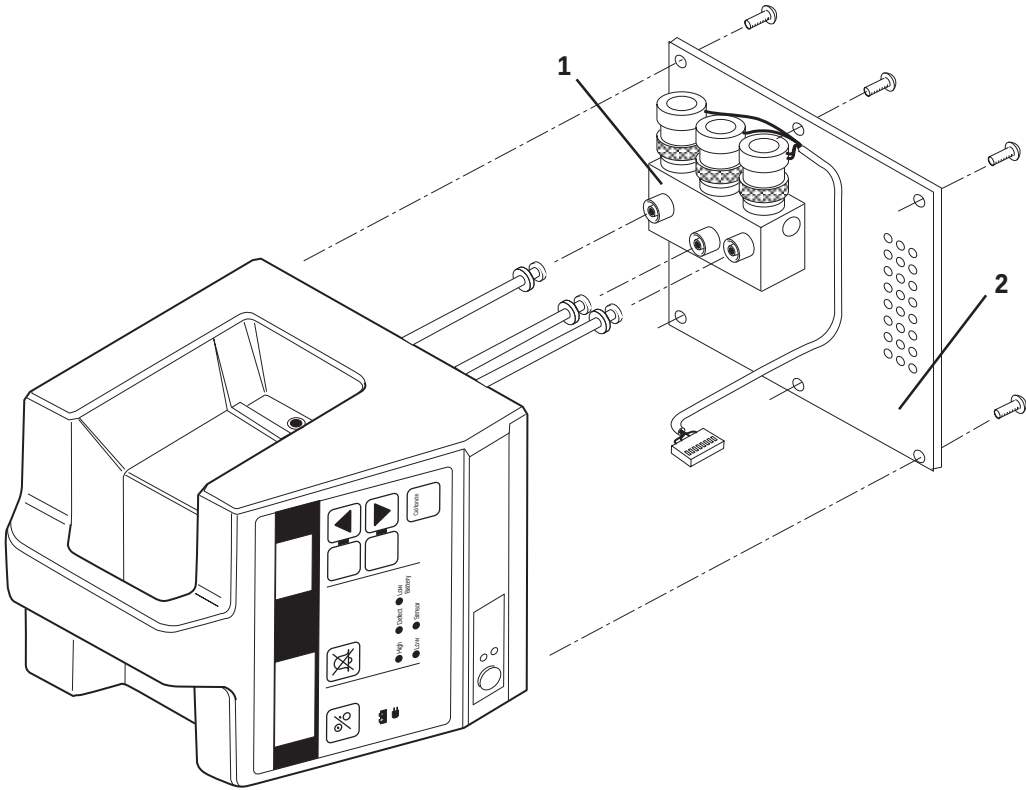


Figure 5-2
Base, manifold and solenoid parts

Item	stock number
1. Manifold/solenoid assembly with valves & label	6600-0696-201
2. Case base (includes label and 4 rubber feet)	6600-0696-219
Not shown	
Manifold fittings kit (includes male & female luer, 1/8 NPT black plug, 1/8 NPT white plug, & two 10-32 UNF plugs)	6600-0696-203

5/Illustrated Parts

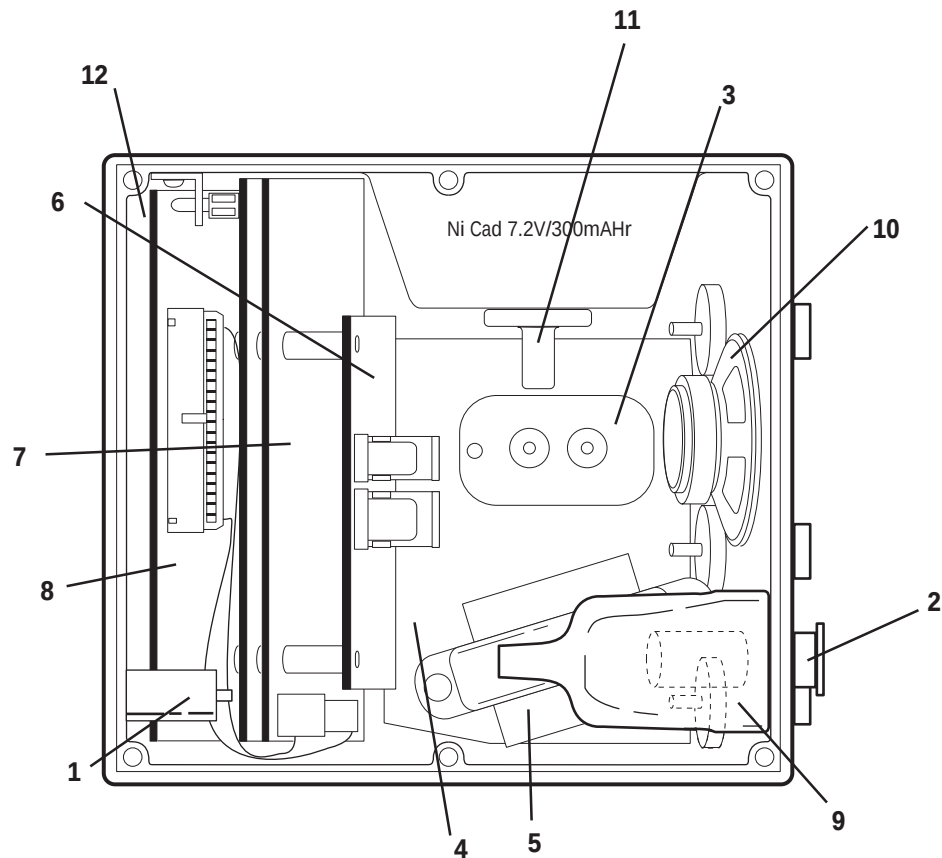


Figure 5-3
Interior parts

Item	stock number
1. Mode indicator (includes cover and barb)	6600-0696-207
2. Mode switch kit (includes actuator, valve and cover)	6600-0696-208
3. Battery kit (includes wire harness & holder)	6600-0696-216
4. Transformer mounting chassis	6600-0696-220
5. Transformer, 110V (includes wire harness)	6600-0696-239
Transformer, 220V (includes wire harness)	6600-0696-240
6. PCB, PSU	6600-0696-231
7. PCB, control board	6600-0696-232
8. PCB, display board	6600-0696-233
9. IEC inlet receptacle with insulation cover	6600-0696-234
10. Speaker (includes wire harness)	6600-0696-238
11. Sensor cable assembly (internal)	6600-0696-241
12. Insulating board assy.	6600-0696-221

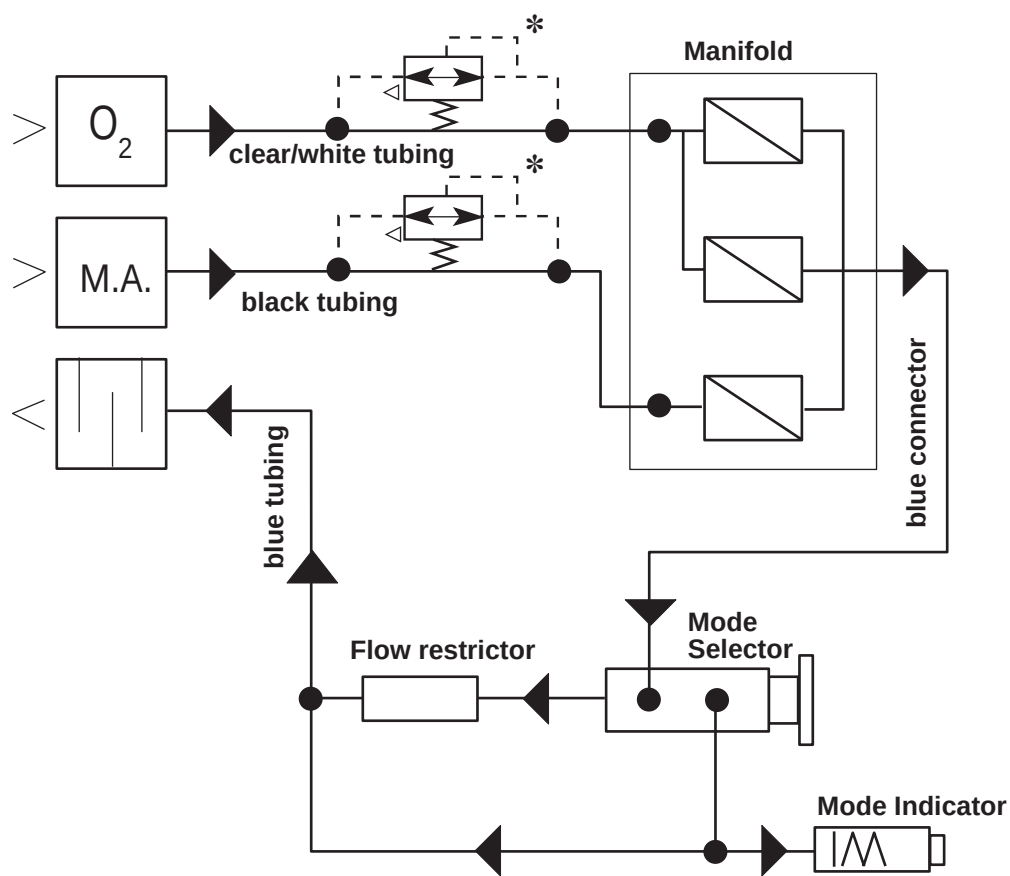
5/Illustrated Parts

Service Kits

Item	stock number
Maintenance kit (includes outbarb assembly and 4 sintered filters)	6600-0696-210
Service Kit (includes tape, load simulator, 50 mV source, 14 pin extension cable, display and Control/PSU board extension cable and Torx driver set)	6600-0696-211
Pneumatic tubing kit (with assembled barbs and fittings)	6600-0696-202
Teflon tape (PTFE) de-greased	6600-0696-212
Clip kit (includes metal speaker clip, PCB Clip, Mode key holder, & swivel elbow circlip)	6600-0696-226
PCB mounting kit (includes spacers and bracket)	6600-0696-227
Hardware kit (includes all screws)	6600-0696-228
Air High Pressure Regulator Kit (includes regulator, regulator holder, tubing and barbs)	6600-0696-243
O ₂ High Pressure Regulator Kit (includes regulator, regulator holder, tubing and barbs)	6600-0696-244

Complete Units

ServO ₂ Oxygen Control System (100-120V, DISS, Canada) ..	6600-0236-902
ServO ₂ Oxygen Control System (100-120V, DISS, Export)	6600-0236-903
ServO ₂ Oxygen Control System (100-120V, NIST, Export)	6600-0236-907
ServO ₂ Oxygen Control System (220-240V, NIST, Export)	6600-0236-904
ServO ₂ Oxygen Control System (220-240V, DISS, Export)	6600-0236-908
ServO ₂ Oxygen Control System, high pressure (100-120V, DISS, Export)	6600-0236-905
ServO ₂ Oxygen Control System, high pressure (220-240V, NIST, Export)	6600-0236-906



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* Valve present on high pressure units only

Figure 6-1
Pneumatic diagram

6/Schematics



Figure 6-2
Control Board Schematic (part 1)

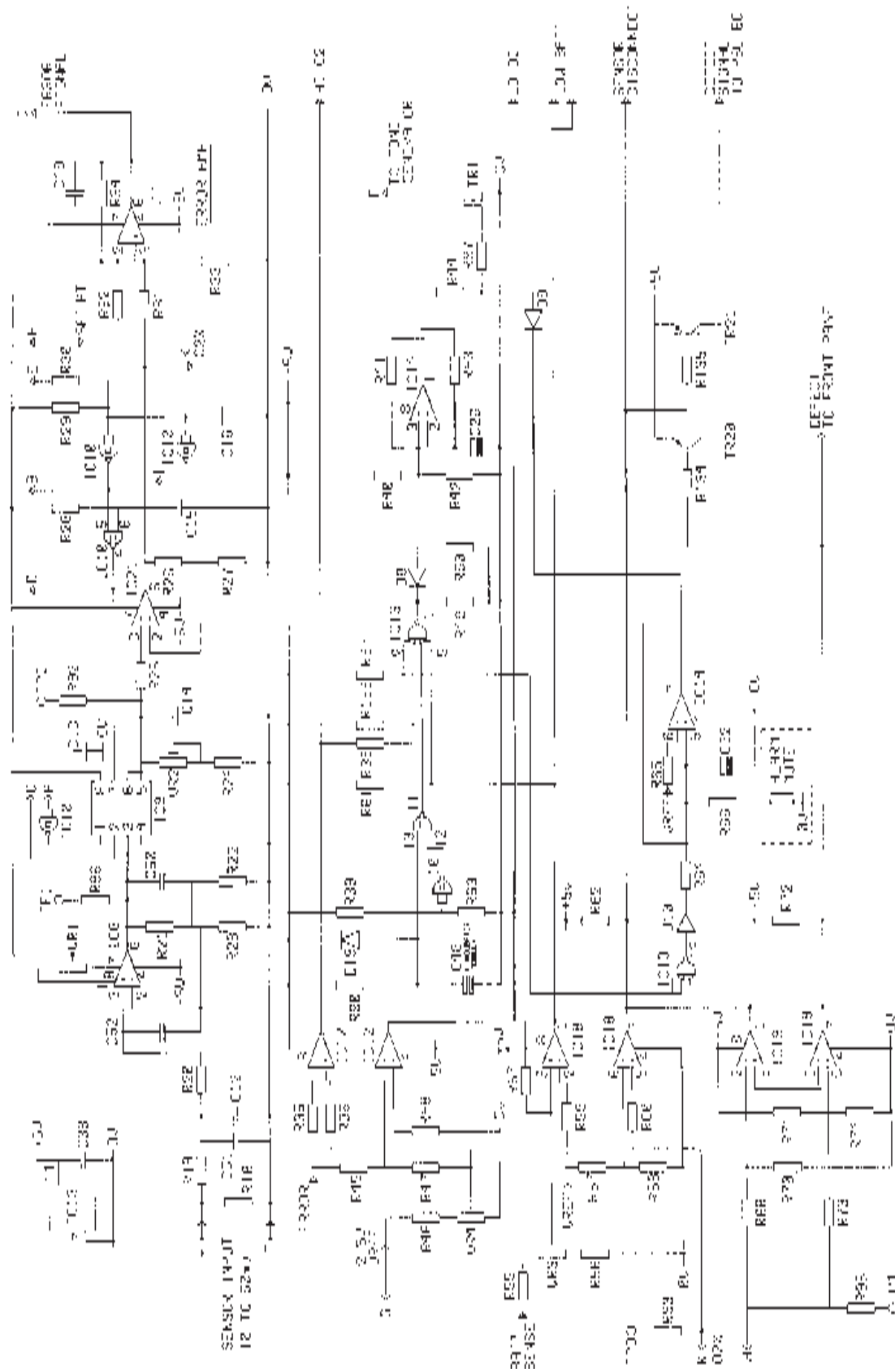
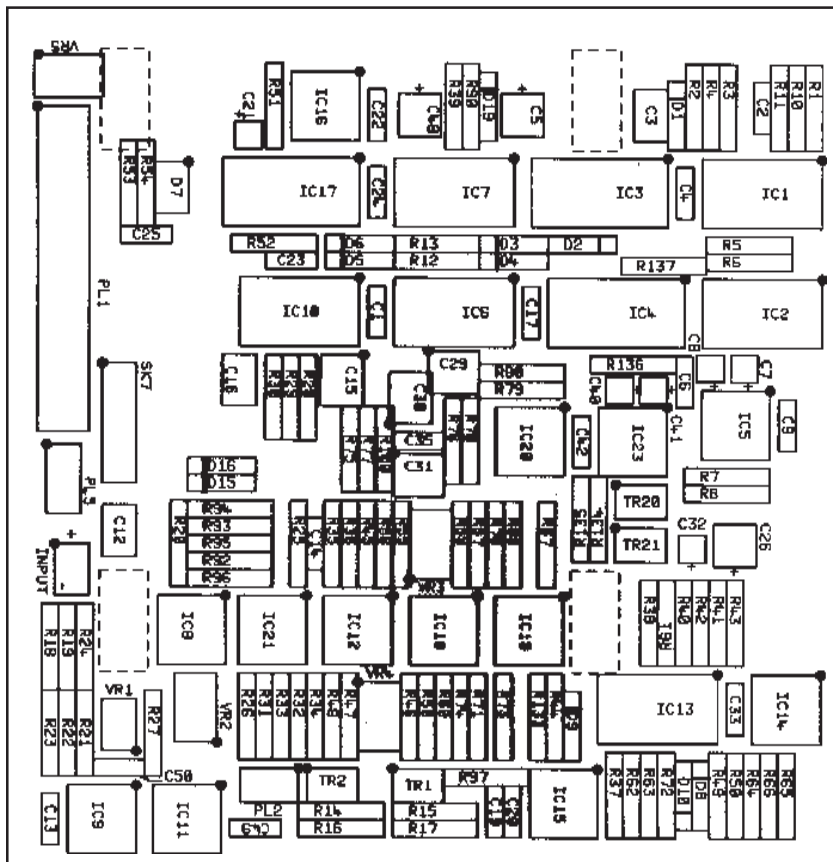


Figure 6-3
Control Board Schematic (part 2)

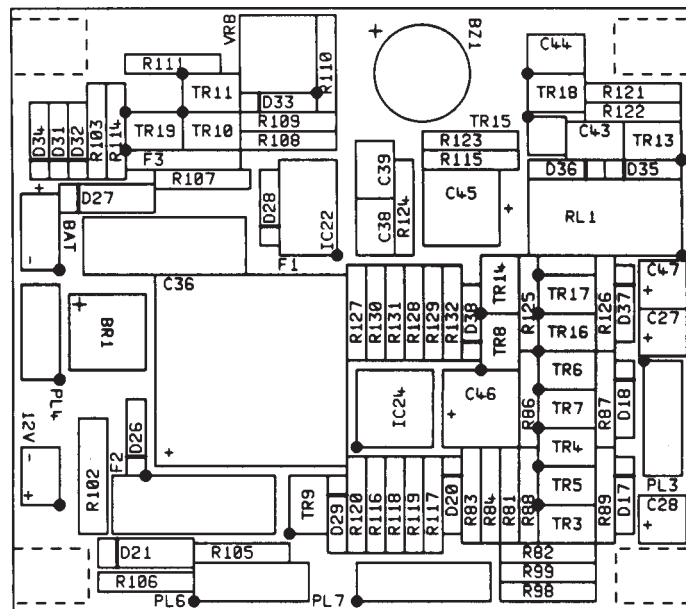
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6/Schematics



Note: Capacitors C51 and C52 connected on the other side of the control board.

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Figure 6-4
Control Board and PSU Board layout

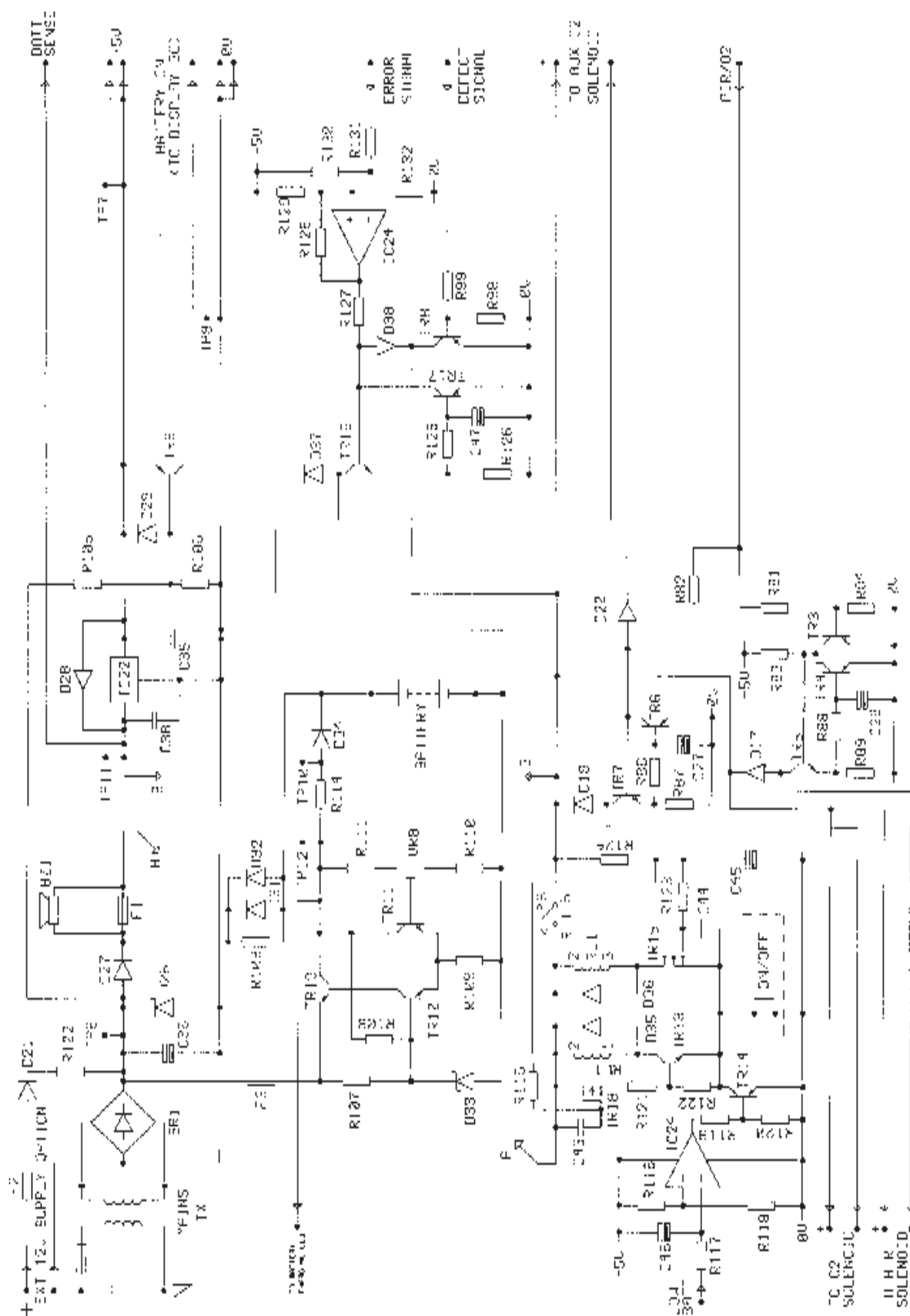


Figure 6-5
PSU Board Schematic

6/Schematics



Figure 6-6
Display Board Schematic

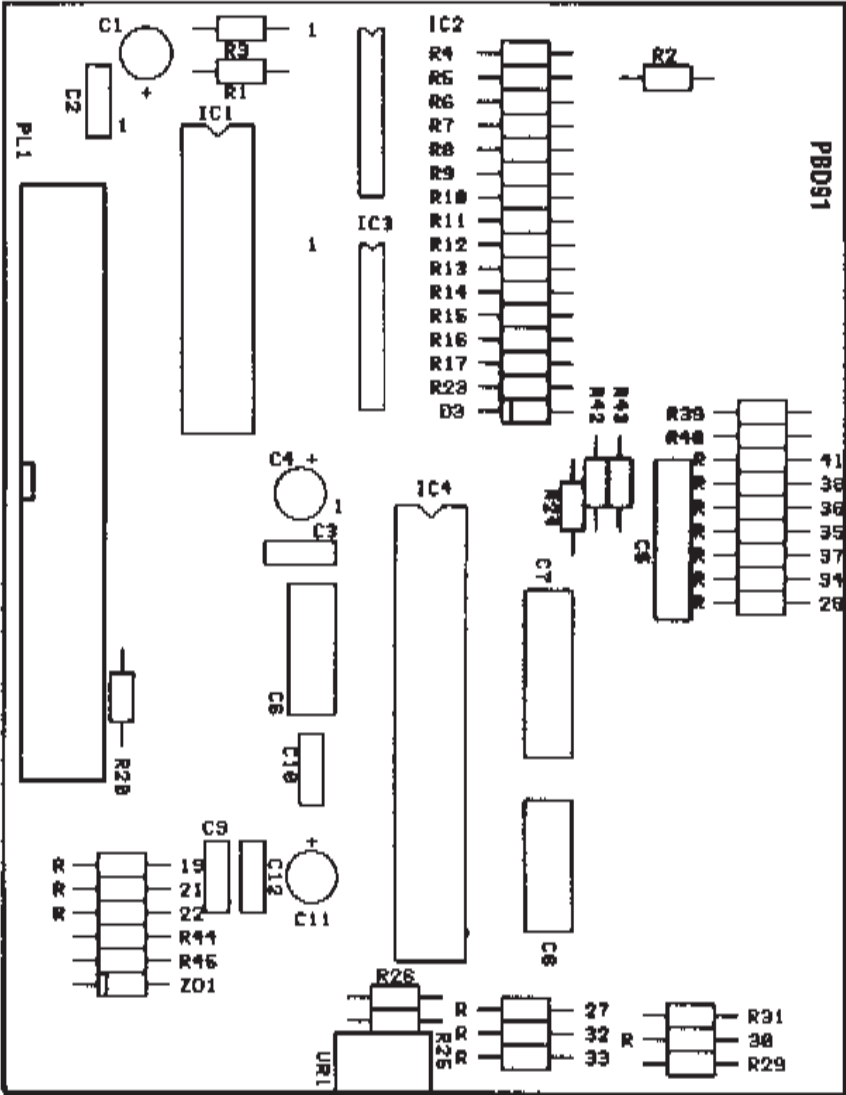


Figure 6-7
Display Board Layout

Appendix

In this section

Specifications

- Electrical
- Gas
- Environmental
- Safety
- Sensor
- Alarms
- Accuracy
- Physical

All specifications are subject to change without notice.

Specifications

Electrical:

Mains Supply Voltage:	100-120Vac (±10%) 220-240Vac (±10%)
Mains Supply Frequency:	50/60Hz
Power Consumption:	5VA
Mains Fuse:	20mm, 250V,50mA, Antisurge
Internal Battery:	7.2V 300 mAhr Nickel Cadmium Rechargeable
Battery Life:	1 hr (nominal) from full charge
Battery Charge Time:	24 hours from total discharge

Gas

Oxygen Supply Pressure:	3 to 4.5 Bar (42 to 65 PSI) High Pressure unit - 4.5 to 10 Bar (65 to 145 PSI)
Medical Air Supply Pressure:	3 to 4.5 Bar (42 to 65 PSI) High Pressure unit - 4.5 to 10 Bar (65 to 145 PSI)
Output Flow:	Incubator mode minimum 12 lpm; 17 lpm (boost) at 3.99 bar Headbox mode minimum 5 lpm (no boost) at 3.99 bar

Environmental

Temperature:	+10 to +57° Celsius
Humidity:	0 to 95% RH
Pressure Range:	500 to 1060 hPa
Environmental (non operating)	
Temperature	−12° to +57° Celsius

Safety



Drip Proof: enclosure designed to prevent the ingress of fluids under vertically falling conditions as stipulated by BS5724/IEC 601-1



Type BF equipment: sensor and delivery tube are floating applied parts.

Appendix



Class II equipment: Earth connection not required for protection against electric shock. Protection is provided by the inclusion of double and/or increased insulation. When servicing use only identical replacement parts.

Mode of operation:	Continuous
Electromagnetic Compatibility:	Meets the requirements of IEC 601-1-2
Enclosure	Normal condition: Less than 100 microamperes
Leakage currents	Single fault condition (interruption of one supply conductor) : Less than 300 microamperes.

Sensor

Sensor Type:	Ohmeda Fuel Cell part no. 6600-0696-209
Humidity:	0-100% RH Non Condensing
Expected Life:	425 000% O ₂ hours (6 months @ 100% O ₂ ; 23°C)
Response:	90% in less than 15 seconds

Alarms

High Oxygen	Fixed 3% (v/v) above setpoint
Low Oxygen	Fixed 3% (v/v) below setpoint
Low Battery	Nominal 7 minutes battery life remaining
Sensor	Sensor disconnect, short circuit or open circuit
Defect	Internal electronic malfunction
Manual Audible Alarm Silence	Nominal 2 mins. Reset upon subsequent depression
Automatic High/Low O ₂ Silence	2 min (nom) from visual alarm
Audible alarm	frequency less than 1KHz power min. 65 dB @ 1 meter

Accuracy

Control Accuracy:	± 1% (v/v) from setpoint
Display Accuracy:	± 2% (v/v) of actual value. Accuracy maintained for a minimum of 24 hours following user calibration.
Alarm Setpoint:	±1 % (v/v) from alarm setpoint
Display Range:	0% (v/v) to 100% (v/v) oxygen concentration
Setpoint Range:	21% (v/v) to 90 % (v/v) oxygen concentration

Physical

Height:	165 mm (6.5 in)
Width:	140 mm (5.5 in)
Depth:	152 mm (6.0 in)
Weight:	1.9 kg (4 lb 3 oz)

Warranty

this Product is sold by Ohmeda under the warranties set forth in the following paragraphs. Such warranties are extended only with respect to the purchase of this Product directly from Ohmeda or Ohmeda's Authorized Dealers as new merchandise and are extended to the Buyer thereof, other than for the purpose of resale.

For a period of twelve (12) months from the date of original delivery to Buyer or to Buyer's order, but in no event for a period of more than two years from the date of original delivery by Ohmeda to an Ohmeda Authorized Dealer, this Product, other than its expendable parts, is warranted to be free from functional defects in materials and workmanship and to conform to the description of the Product contained in this operation manual and accompanying labels and/or inserts, provided that the same is properly operated under the conditions of normal use, that regular periodic maintenance and service is performed and that replacements and repairs are made in accordance with the instructions provided. This same warranty is made for a period of thirty (30) days with respect to expendable parts. The foregoing warranties shall not apply if the Product has been repaired other than by Ohmeda or in accordance with written instructions provided by Ohmeda, or altered by anyone other than Ohmeda, or if the Product has been subject to abuse, misuse, negligence, or accident.

Ohmeda's sole and exclusive obligation and Buyer's sole and exclusive remedy under the above warranties is limited to repairing or replacing, free of charge, at Ohmeda's option, a Product, which is telephonically reported to the nearest Ohmeda Regional Service Office and which, if so advised by Ohmeda, is thereafter returned with a statement of the observed deficiency, not later than seven (7) days after the expiration date of the applicable warranty, to the designated Ohmeda Service Center during normal business hours, transportation charges prepaid, and which, upon Ohmeda's examination, is found not to conform with above warranties. Ohmeda *shall not be otherwise liable for any damages including but not limited to incidental damages, consequential damages, or special damages.*

There are no express or implied warranties which extend beyond the warranties hereinabove set forth. Ohmeda makes no warranty of merchantability or fitness for a particular purpose with respect to the product or parts thereof.

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